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Empirical Study of Research Performance Leading to Education 4.0 using the iLearning Method

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ABSTRACT

Lecturers as one of the agents of change are currently required to be able to contribute more in the educational revolution which currently also enters Education 4.0, especially in the development of higher education chess dharma in Indonesia. However, the rapid advances in technology have not been matched by the interest and quality of research from the lecturers themselves. The purpose of this study was to analyze the iLearning method in improving the quality of lecturer research that is currently oriented or leading to Education 4.0. The iLearning method was chosen as a strategy to see the level of interest and motivation of lecturers in conducting research. The method of analysis in this study is mixed qualitative and quantitative analysis, web-based questionnaire surveys used to collect primary data, and Structural Equation Modeling (SEM) used to test the proposed research model, distributed to 217 respondents by random sampling. The quality and performance of lecturers research is measured through an integrated system in universities by comparing the number of lecturers with research achievements.

Key words: Research Quality, Education 4.0, iLearning

1. INTRODUCTION

The digital transformation of Industry 4.0 is converging towards Education 4.0. In Education 4.0, learning is connected with students, focused on students, indicated by learners and led by students [1]. Based on recent student-based innovations both within and outside the educational context, this era brings new responsibilities for learners and teachers to balance change to be innovative and competitive. This is a new challenge to redefine new education 4.0, to identify intelligent people, who are creative and innovative [2].

In line with Law No. 12 of 2012 [3] The Tridharma of Higher Education, hereinafter referred to as Tridharma, is the obligation of Universities to organize education, research, and community service. Besides that, strategically through RI Government Regulation (PP) no. 14 of 2015 concerning 2015-2035 National Industrial Development Master Plan [4] said that one of the targets and stages of industrial development achievement was the increasing development of innovation and mastery of technology which was very much determined by the speed of accumulation of science which began with research. In line with RIRN's vision for 2017-2045 Indonesia 2045 is Competitive and Sovereign Based on Research, so every university is expected to be able to boost Tridharma activities, especially research in this case is a reputable journal publication. Based on data obtained from Scimagojr, it is known that the comparison of the number of scientific articles, citations, and Scopus H indexes from ASEAN countries namely Malaysia, Singapore, Indonesia, Thailand and Vietnam in 2017.

Differences in socio-economic conditions in each era are very urgent for unique and skilled human resources. The responsibility for developing the required skill set lies in individuals in learning management, to develop the knowledge, skills and abilities associated with these problems according to the needs of the community [5]. Current educational institutions are described as industrial plants, students such as products, curriculum such as product specifications, tests are quality control, certificates or diplomas such as paper guarantees and educational institutions such as product brands [6]. The education system can be modernized by imitating the industrial revolution [7]. Human resource development is an increasingly important aspect in an organization [8], lecturers as one of the agents of change are currently required to be able to contribute more in the education revolution which currently also enters Education 4.0.

The performance of the lecturers themselves is assessed from chess dharma, namely education and teaching, research, community service and culture [21]. In line with this, lecturers as educational staff in higher education are groups of workers with the obligation to perform tasks that are not easy because they have to improve their performance in four aspects; they are (1) conducting education and teaching, (2) conducting research, (3) making dedication to the community, and (4) supporting elements of lecture activities [9]. On the other hand, lecturers are also demanded for their responsibilities, cooperation, loyalty, leadership [10]. Specifically the research performance is the most specific thing needed, in this study a test was conducted to prove that the quality improvement of research performance can be realized through the iLearning method in line with the development of Education 4.0 [20][28].

The importance of non-leading universities that do not have a reputation depends on whether the institutional context offers opportunities to challenge an established reputation, the

effectiveness of the organization excels in the public arena. Reminds of a strong correlation between research performance and annual university targets, one possible way to invest in improving research performance. Others may not believe in this indirect path and only aim directly at improving the results of organizational effectiveness captured by tables or rankings such as the quality of teaching. Based on the above theoretical background, it is expected to provide space for lecturers to participate in decision making to have a positive impact on lecturer performance in teaching, research, publications, public services, and managerial involvement activities.

4.0, this code was initially used to mark disturbing changes, which occurred in the manufacturing industry through the broad application of Information and Communication Technology. A network ecosystem that will improve skills and build competency in the new manufacturing era is now often called Education 4.0 or leading education [7]. Education 4.0 considers, on the one hand, the exploitation of technology developed (for example sophisticated visualization techniques that integrate virtual reality) to facilitate the teaching process and on the other hand methods and workshops that will familiarize prospective engineers with this technology, such as going to work in an Industrial 4.0 environment.

Education 4.0 serves the needs of the community in the 'innovative era'. This is consistent with behavior that changes with specific characteristics of parallelism, connectivity, and visualization. This learning management must help develop the ability of lecturers to apply new technology, which will help lecturers to develop according to changes in society. Learning management this era is a new learning system, which allows students to grow with knowledge and skills, not only to know how to read and write but also in society and equipped with their best abilities. Therefore, Education 4.0 will be more than just education.

Changes in technology continue to change the possibilities for learning and create new challenges for pedagogy. Over the past two decades, colleges and universities have adapted and responded to the Internet, e-mail, chat and instant messaging, course management software, podcasts, personal digital assistants (PDAs), and more. The increasing use of cellular technology in colleges and universities is the latest trend that forces educators to evaluate the advantages and limitations of new technology. Some researchers argue that, now the Internet and digital technology increase the potential for higher access to education, students and faculty who are not ready to need support institutional that provides intensive, permanent. The paper is structured as follows and next, relevant literature is summarised and hypotheses are developed [23].

2. RELATED WORK

Education 4.0 is an innovation from the application of selective knowledge, which began in Education 3.0 as a mode of knowledge distribution, identifying, creating and utilizing new and future-oriented formats for sharing knowledge [11]. Education 4.0 serves the needs of the community in the 'innovative era'. This is consistent with behavioral changes with special characteristics of parallelism, connectivity [12]. Therefore, it is very important for lecturers to compensate for changes to be competitive and this is a new challenge to redefine the new Education 4.0, to determine which lecturers are creative and innovative[13].

One indicator for achieving private universities is the number and qualifications of higher education. The effort to improve the quality of lectures at private universities is to consider in higher education that runs naturally, it is intended to increase the knowledge of the instructors needed not to come from the management [7][14]. Identifying and facilitating the factors that influence the performance of lecturers in higher education has become a top priority, in Indonesia, for lecturers more involved in research, teaching, publications, public services and other managerial activities into academic requirements and prerequisites for lecturers to get academic rankings higher [15]. Universities with strong research performance are also ranked well in the field of non-research that has organizational effectiveness [16][19]. Research performance through faculty incentives, monitoring and recruitment or, on the other hand, only collects and transmits whatever is generated academically without trying to influence it to a certain extent. A stronger oriented strategy is more likely to be adopted if the institution considers it can lead to better university rankings.

The focus of Education 4.0 is around "learning experiences" by individuals - the theory and foundation of teaching delivered across platforms supported by technology and integration closer to Industry and society provides a strong platform for peer learning, social interaction, and real-world problems.

3. METHODOLOGY

In this study, we use Structural Equation Modeling (SEM) [26][27] to analyze reliability, validity, and test hypotheses that we have made. In PLS using mixed qualitative and quantitative analysis [29]. A number of lecturers working at various private universities participated as respondents in this study 98 questionnaires were distributed to respondents using the slovin formula. A good sample is a sample that can present a population, in other words a good sample is a sample that has good aspects of validity [17]. The minimum sample size to be processed with Structural Equation Modeling is 5 (five) to 10 (ten) times the indicator [18]

$$n = \frac{N}{1 + N\,(e)2}$$

$$n = N / 1 + N\,(e)^2$$

n = Number of Samples

N = Total Population

e = Error Rate

The sampling technique can use the Slovin formula with an error rate of 10%

$$n = N / 1 + N (e)^2$$

$$n = 162 / 1 + 162 (0.1)^2$$

$$= 61.83 \rightarrow 62 \text{ permanent lecturer}$$

3.1 Measurement of variables

There is a hypothesis in this study, Figure 1. is a research model used in this study, consisting of 3 (three) variables namely Quality Research Performance, iLearning Method and Education 4.0.

Research performance in academia typically refers to scientific advancements, predominantly published in academic journals. Research quality refers to the impact rather than amount of research output [23] with higher education governance increasingly focusing on research output, additional control mechanisms have been introduced to assess research performance [24]. In this study measured the effect of the quality of research performance on education 4.0

Hypothesis 1: There is a positive and significant influence on the quality of research performance on education 4.0

The performance of lecturers' research contributes to the development of Education 4.0 [7], besides that it can also provide students with predictions about schedules and opportunities for collaborative learning. Global integration and technological progress have a transformational effect on research. As research becomes democratic, funds must be used optimally. Universities need to build management capability projects around research to ensure fast turnarounds, reduce costs and schedule better overruns and collaborations in industry and academia. Universities with weak financial statements can get past this student finance in the form of increased school fees, but price-sensitive students are now turning to alternative affordable educational resources such as the massive online open courses (MOOCs). The incentive for iLearning clients can be accessible from Internet-based administrations [25]. Universities need to diversify their revenue streams and explore sustainable business models to continue operations. They must ensure that these resources are optimally aligned with financial stability at its core. Various ways of promoting iLearning, and support from organizations can encourage the use and benefits of iLearning adoption [25].

Hypothesis 2: There is a positive and significant effect of iLearning methods on education 4.0

Hypothesis 3: There is a positive and significant impact on the quality of research performance and iLearning methods on education 4.0

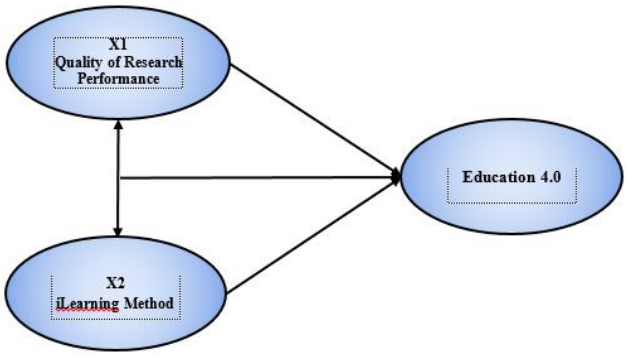

Figure 1: The Research Model

Using a Likert scale consisting of 5 (five) points ranging from 1 to 5 with questions about the quality of research, teaching, publications, public involvement and managerial involvement performance using Analysis of Moment Structures.

4. RESULTS AND ANALYSIS

In this study using Structural Equation Modeling (SEM) to test and analyze the relationships hypothesized in the proposed research model. We have used the tolerance value and variance inflation factor (VIF) to check multicollinearity between variables. The results found no evidence of multicollinearity among variables. As Figure 2 shows, the structural model produces a chi-square value of 103.122. Comparison of all match indices, with the corresponding recommendation values, shows a good model match (CFI = 0.989, GFI = 0.942, AGFI = 0.917, NFI = 0.946, and RMSEA = 0.032). Figure 2 shows the estimation of the structural model where the estimated parameter is the standardized path coefficient.

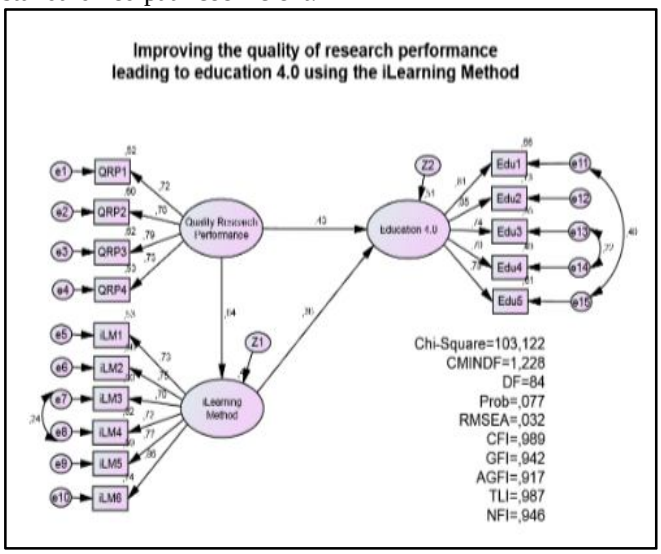

Figure 2: Research Output

This study empirically examines the impact of lecturer participation on the performance of lecturers in higher education institutions in Indonesia. There are several conclusions based on the research findings described in the previous section. First, this study found that academic rankings positively influenced the performance of lecturers. Of course, in Indonesia, being more involved in research, teaching, publications, public services, and other managerial activities becomes an academic requirement and a prerequisite for lecturers to get a higher academic ranking. Second, gender status, university status, age, experience, marital status, and education did not significantly affect the performance of lecturers. This finding shows that it is a high priority that the Indonesian government immediately builds a better performance appraisal system and reward system to get better performance lecturers. Third, this study found that participatory decision making had a significant impact on the performance of lecturers in higher education institutions in Indonesia.

Table 1: Standardized Regression Weights

			Estimate
iLearning_ Method	<---	Quality_Research_ Performance	,639
Education_ 4.0	<---	Quality_Research_ Performance	,431
Education_ 4.0	<---	iLearning_Method	,360
QRP2	<---	Quality_Research_ Performance	,777
QRP3	<---	Quality_Research_ Performance	,787
	<---	Quality_Research_ Performance	,731
QRP1	<---	Quality_Research_ Performance	,720
iLM3	<---	iLearning_Method	,704
iLM2	<---	iLearning_Method	,746
Edu4	<---	Education_4.0	,700
Edu3	<---	Education_4.0	,738
Edu2	<---	Education_4.0	,854
Edu1	<---	Education_4.0	,810
iLM1	<---	iLearning_Method	,731
iLM4	<---	iLearning_Method	,720
iLM5	<---	iLearning_Method	,771
iLM6	<---	iLearning_Method	,862
Edu5	<---	Education_4.0	,780

This finding strongly recommends education leaders to encourage higher levels of teacher involvement both emotionally and physically decisions related to school operations and management, student school experience, work life of teachers and control of classroom teaching. Thus, this policy is expected to improve the performance of lecturers and universities.

5. CONCLUSION

Finally, to capture a deeper explanation of the factors influencing education 4.0 in higher education institutions in Indonesia to better pay attention to the performance of research using the iLearning method[30][31], it is recommended that future research consider other personal and organizational factors such as motivation, recruitment system, performance appraisal system and reward system.

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